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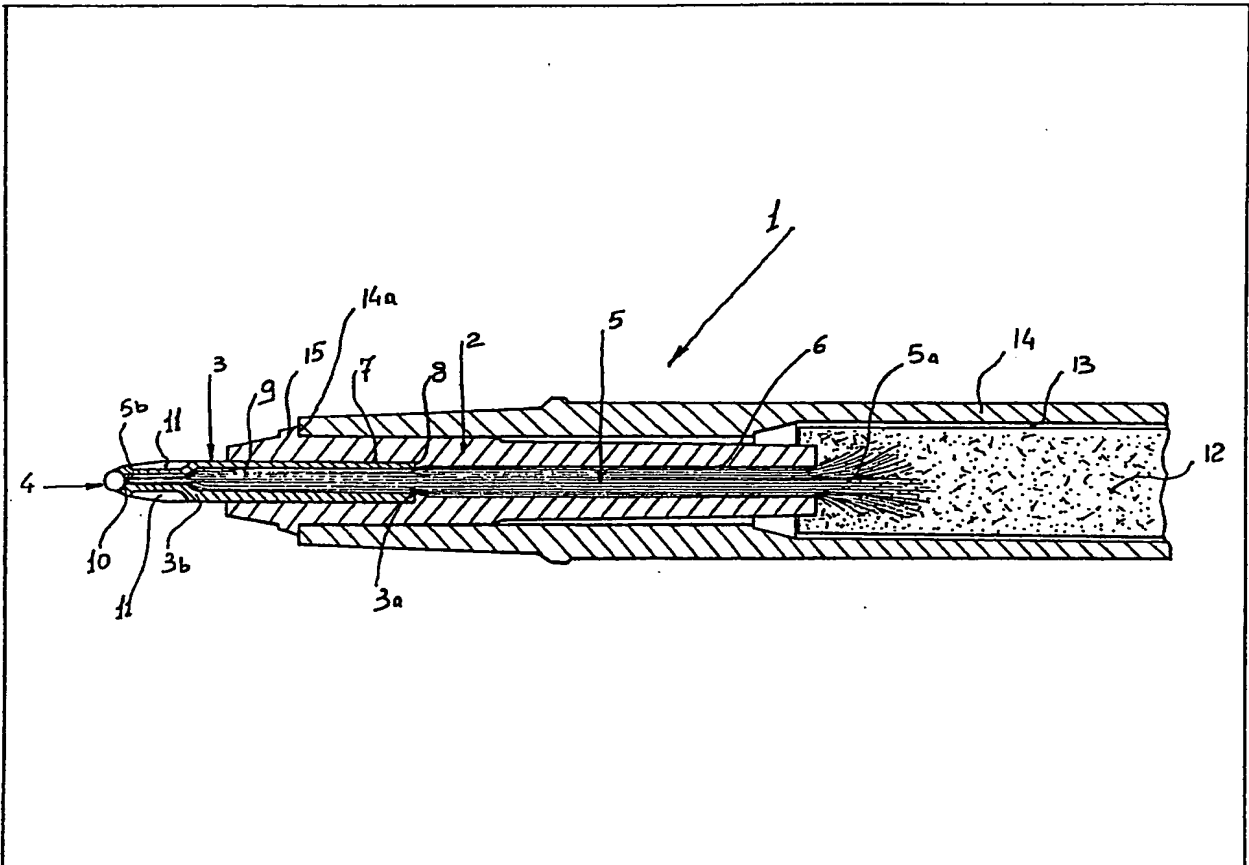
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(54) Ferrule for ball-point pens

(57) A ferrule for ball-point pens
consists of a pierced sleeve (2) with
which engages one end (3a) of a small
stainless steel tube (3) which is also

provided with a longitudinal through
hole (9), the opposite end (3b) of said
small tube (3) projecting from sleeve
(2) and being provided with a stainless
steel ball (4) and housed in a socket
(10) obtained by means of three or
more punchings (11) close to the end
(3b) of the small tube (3), plaited
strands of polyester fibres (5) being
secured at one end (5b) within the end
portion (3b) of the tube (3) while the
opposite end (5a) projects from sleeve
(2) and is dipped into an ink pad (12)
disposed rearwards to the ferrule.



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SPECIFICATION

Ferrule for ball-point pens

The present invention relates to a ferrule for a ball-point pen.

5 Ball-point pens actually known in the art have a brass point which is almost always cone-shaped and has at its end a stainless steel ball. The point is crossed by feeding channels from which ink reaches the ball that, rotating while the pen moves
10 across the paper, collects and distributes it on the paper itself. At the rear portion of the writing point is connected a small tube made of brass too or of any suitable plastic material, containing the ink supply. Both said parts together form what is called
15 in technical language "refill".

The refill is then introduced into a hollow trunk which can be either of wood or of metal or of a plastic material. The construction of these pens begins with forming the point which can be either
20 of cylindrical or of conical form and is obtained from a brass bar; this point is then drilled in order to obtain at its inside the ink feeding channels; finally, the ball is applied.

After being prepared in this way, the point is
25 connected to a small tube which in turn has been filled with ink. The latter generally is an oily dye solution suitably thickened by adding resins, which must not contain suspended particles and above all must be very stable as to the dye. Vegetable
30 oils (such as castor oil, etc.), fatty acids (such as oleic and ricinoleic acids) and glycerine are used as oily carrier while, as thickening agents, natural or synthetic resins are used.

It is also to be understood that ink must not drip
35 from the metal point and must have an appropriate surface tension so that it can evaporate in a few seconds.

There are also other kinds of pens, commonly called fibre-pens, by this term indicating both
40 fibre-pens and felt-pens.

Felt-pens consist of a pen holder made of plastic material the point of which carries a thick writing wick (felt). This felt continues to the inside of the pen holder where it soaks the ink for writing
45 from a drenched cartridge. The writing line can be more or less fine according to the thickness of the felt. The pen holder is closed at the top by a plug and the point is also closed and protected by a hermetic cover or pen-cap when it is not used.

50 The fibre-pen also called nylon-tipped pen, fundamentally consists of two inner parts; that is: the writing point or nib and the ink reservoir or pad. The writing point consists of a bundle of nylon or acrylic fibres and is obtained by
55 polymerization. By this polymerization process it is possible to produce interspaces between each single fibre and the next one, through which ink can uniformly flow down by capillarity.

The polymerization process used for the
60 formation of a nib allows to obtain writing points having a diameter four or five times bigger than the necessary one; therefore, a subsequent step is provided in which, by means of stretching or removing actions the nib diameter reaches the

65 utilization size; that is only done in order to allow said interspaces to be more interdependent and branched.

According to the kind of point obtained we have pens for fine writing and for drawing. Pens
70 for fine writing carry hard and compact points while pens for drawing carry soft points, generally consisting of treated and polymerized polyester fibre bundles.

The reservoirs are small hollow cylinders made
75 of polyvinylchloride, generally obtained by extrusion, filled with a bundle of cellulose acetate fibres of various density or with a bundle of polyester fibres, depending upon the presence or the absence of thinners in ink.

80 Finally inks are of aqueous type and contain additives which improve the writing features.

The latest type of pen put on the market consists in assembling an ink reservoir or pad, a ball-point and a capillary element (small stick) of
85 the type formed from polyester fibres, disposed between the pad and the ball. The use of these pens is identical to that of pens hitherto mentioned except the traditional ball-point pens, and it is based on the capillary principle. In fact as
90 the small stick has a much smaller diameter than the pad, it brings ink, by capillarity, closely adjacent the ball which, by rotating, distributes it on the writing paper.

However, though these pens join together
95 particular and specific features of each single pen mentioned above, they have important drawbacks. The binder used to hold the fibres of the small stick together tends to reduce the interspaces necessary to the capillarity and therefore they must
100 have a bigger diameter in order to allow the ink to flow down at the right rate. However in this way the small stick is no more in direct contact with the ball and therefore, owing to particular angular inclinations of the pen, ink, being of aqueous type,
105 does no more wet the ball which cannot write.

Particular means have been adopted in order to obviate said drawback and therefore allow a direct contact between the ball and the small stick, such as for example the interposal of specific cross-shaped elements or the like between the ball and the small stick which however, having a weak capillarity, were not in a position to solve this problem. In addition, these pens write correctly
110 only if the envelope containing the ball is of steel; in fact when it is of plastic material, which occurs very often, owing to evident working tolerances, it is the outer edge of the envelope that writes and not the ball, this involving smudges and a not very neat writing.

The problem which is at the basis of this
120 invention is to carry out a ferrule for ball-point pens which overcomes the above mentioned drawbacks, at the same time allowing a neat and smudge-less writing with any angular inclination of the writing point.

125 This problem is solved according to the present invention by a ferrule for ball-point pens which is characterized in that it consists of a sleeve generally made of plastic material, provided at

the inside with a longitudinal through hole which for a predetermined length has a circular cross section of smaller diameter and for the remaining length has a circular cross section of bigger diameter, an inner annular abutment ring being formed in the area of changing of the two sections, with said ring engaging one end of a small stainless steel tube, provided with a longitudinal through hole of a small diameter, introduced with forcing tolerances into said circular cross sectional hole having a bigger diameter, the end of said small tube opposite to that engaged with said inner annular ring projecting forwardly from said sleeve and being provided with a stainless steel tiny ball disposed in a suitable housing obtained at the end of said small tube by means of three or more longitudinal punchings, at the inside of the small tube and of the sleeve hole having a smaller diameter being arranged a plait formed from strands of textured polyester fibres one end of which is fixed to the end of the small tube provided with the above mentioned three or more longitudinal punchings and the opposite end of which, that projects from the sleeve, being dipped into an ink pad for example of the kind formed of a bundle of cellulose acetate fibres or polyester fibres disposed rearwards to said ferrule, said sleeve being furthermore provided with an outer annular abutment ring obtained close to the end thereof that carries the small steel tube which, when the ferrule is mounted in the outer envelope (casing) of the pen, abuts against the fore part of said casing.

Further features and advantages will become evident from the detailed description of a preferred but not exclusive embodiment of a ferrule for ball-point pens made hereinafter with reference to the accompanying drawing given by way of example only.

Referring to the only figure, it has been generally indicated at 1 a pen (partially shown) provided with the ferrule which is the object of the present invention. Said ferrule consists of a sleeve 2, a small stainless steel tube 3, a tiny ball made of steel too and a plait formed from strands of textured (i.e. made bulky and resilient) polyester fibres.

Sleeve 2 is provided with a longitudinal through hole which for a predetermined length has a circular cross section 6 of smaller diameter and for the remaining length has a circular cross section of bigger diameter. In the area of changing of the two sections an inner annular abutment ring 5 is formed that engages with the end 3a of said small tube 3 which is provided with a through hole 9 having a small diameter. The small tube 3, which is introduced with forcing tolerances into the hole 7 of the sleeve 2, has its ends 3b opposite to the end 3a that abuts against the inner annular ring 8, projecting forward from sleeve 2. The end 3b of the small tube 3 carries the tiny ball 4 which is housed, with possibility of rotating, in a socket 10 obtained by means of three or more longitudinal punchings 11 carried out rearwards to the tiny ball

4 on the small tube 3.

The plait formed from strands of polyester fibres 5 which extends across the hole 9 of the small tube 3 and the hole 6 of sleeve 2 has its end 5b firmly secured to the portion of the small tube 3 provided with said punchings 11. In this way the direct contact between the tips of the plait formed from strands of polyester fibres 5 and the tiny ball 4 is assured

The opposite end 5a of said plait 5 projecting from sleeve 2 is on the contrary dipped into an ink pad 12, for example of the type formed of a bundle of cellulose acetate fibres or polyester fibres, disposed rearwards to the ferrule in a cylindrical housing 13 obtained in the envelope or casing 14 of pen 1.

It should be observed that sleeve 2 is provided at its end carrying the small tube 3 with an outer annular ring 15 which, when the ferrule is assembled, abuts against the corresponding forward surface 14a of the casing 14 of pen 1.

In order to allow a ready and correct assembling of the ferrule in the casing 14 of pen 1 and to avoid damages or undesired bending of the polyester fibres at the end of plait 5a, the outer surface of sleeve 2 tapers upwardly as clearly seen in the accompanying drawing.

Owing to the principle of capillarity on which the use of these pens is based, the remarkable advantage obtained by adopting the ferrule of the invention is due to the fact that the ink has to pass through three stepped sections (pad section, plait section in hole 6 and plait section close to punchings 11 in the small tube 3) before reaching the tiny ball, which gives rise to a remarkable increase in capillarity of the whole. As a result, in this specific case the amount of ink reaching the tiny ball is much more than with the methods of the known art. Furthermore it should be understood that the strands of the plait fixed to the portion of the small steel tube provided with punchings are always directly in contact with the tiny ball. In this way, whatever is the angular inclination of the pen, the ink can always reach the tiny ball and consequently the use of this pen always assures a neat and smudge-less writing and, which is more important, a homogeneous and unbroken line.

Obviously, though the embodiment of the ferrule as described hereinbefore is the preferred one, it should be understood that modifications may be made to the construction of the ferrule itself without departing from the spirit and scope of this invention as defined in the appended claims.

CLAIMS

1. A ferrule for ball-point pens characterized in that it consists of a sleeve generally made of plastic material provided at the inside with a longitudinal through hole which for a predetermined length has a circular cross section of smaller diameter and for the remaining length has a circular cross section of bigger diameter, an inner annular abutment ring being formed in the

area of changing of the two sections, with said ring engaging one end of a small stainless steel tube, provided with a longitudinal through hole of a small diameter, introduced with forcing tolerances
5 into said circular cross sectional hole having a bigger diameter, the end of said small tube opposite to that engaged with said inner annular ring projecting forwardly from said sleeve and being provided with a stainless steel tiny ball
10 disposed in a suitable housing obtained at the end of said small tube by means of three or more longitudinal punchings, at the inside of the small tube and of the sleeve hole having a smaller diameter being arranged a plait formed from strands of textured polyester fibres one end of
15 which is fixed to the end of the small tube provided with the above mentioned three or more longitudinal punchings and the opposite end of which, that projects from the sleeve, being dipped

20 into an ink pad for example of the kind formed of a bundle of cellulose acetate fibres or polyester fibres disposed rearwards to said ferrule, said sleeve being furthermore provided with an outer annular abutment ring obtained close to the end thereof that carries the small steel tube which,
25 when the ferrule is mounted in the outer envelope (casing) of the pen, abuts against the fore part of said casing.

2. A ferrule for ball-point pens according to
30 claim 1 characterized in that the outer surface of said sleeve has a conical development with a sudden tapering close to a portion approximately corresponding to the centre line of the sleeve itself.

35 3. A ferrule for ball-point pens according to claims 1 and 2 and as hereinbefore described with reference to the accompanying drawing.